



Documentation

The following information sheets illustrate the description below:

12-X101-4G-E	Sectional view of the lance with main dimensions
12-W101-6G-E	Sectional view of the head of the lance with atomiser (central return bore)
12-W101-6M-E	Sectional view, the head of the lance and atomiser (return bores on circle)
00-X101-8G-E	Diagram of hydraulic system inside the lance

General

The burnerlance 12-EHR-N is especially suitable for use in or on an oil burner and is designed to operate spill back atomisers with integrated shut-off needle. The strong spring on the actuating rod pushes the needle in closed position. This ensures a reliable shut-off under all circumstances.

Fuel, branched off from the supply line and controlled by the solenoid valve on the hydraulic block, actuates the piston for opening. The piston has a fixed travel. The end position of the actuating rod can be checked hydraulically, allowing this check to be integrated into the burner control system. While opening, the needle inside the atomiser is retracted in the correct position by means of a spring at the back of the atomiser against a fixed stop on the needle itself.

During the pre-purge period of the burner, the needle is keeping the orifice closed and the fuel circulates through the lance. This way, when firing heavy fuel, the entire hydraulic system heats up before igniting. On energising the solenoid valve, even after long idle intervals, there is immediate atomisation guaranteeing perfect ignition.

An internal volume regulator in the return line controls the output flow of the atomiser. Turning the regulator shaft changes the aperture inside the regulator, consequently changing the fuel flow rate. Both flanges at the regulator shaft are marked with a "+", a scale in 15° steps and a "-". The pointer mounted on one side of the regulator shaft shows the actual position of this shaft.

The burnerlance is suitable for supply pressures from 20 up to 40 bar and fuel temperatures up to 140°C. The ambient temperature near the coil should not exceed a maximum of 60°C.

Mounting the atomiser

Often a lance is delivered with the atomiser mounted. This is just to avoid loss during transportation. The atomiser then has been screwed on by hand, not tightened. In this case, you should also mount the atomiser as described below.

The atomiser is to be built in according to information sheet 12-W101-6G-E or 12-W101-6M-E. To ensure adequate sealing, the sealing surfaces at the adaptor and at the atomiser should not be damaged. Never use any additional sealant on these surfaces.

If necessary, remove the plastic plug from the adaptor and make sure no material stays behind. Make sure all parts involved are clean and free from any dust or other particles. It is advised to apply a little "Molykote HSC" or equivalent compound, on the thread of the atomiser only, to prevent problems when dismantling the atomiser after a longer period. The sealing surface of the adaptor, the inside of the lance and the other parts of the atomiser are to be kept absolutely clean.



Now screw on the atomiser by hand as tight as possible. Tighten it firmly with a spanner. The adaptor has flat sides to hold the lance while screwing or unscrewing the atomiser. These flats exclusively serve this one purpose!

Mounting the solenoid valve

The information sheet 12-X101-4G-E shows the assembly of the solenoid valve. The coil and the solenoid with armature, o-ring 16,1x1,6 and two nuts are packed separately with the lance to prevent damages during transport.

After removal of the synthetic plug from the control block, all parts involved have to be checked to be totally clean. Place the o-ring 16,1x1,6 in the sharp edged groove in the control block ensuring that it will not be damaged or partly cut off during further assembling. Push the solenoid containing the armature straight against the o-ring and tighten the nut by hand. Tighten it just slightly with a spanner.

Now push the coil on the solenoid and tighten the nut by hand. Tighten it just slightly with a spanner.

Connections

The connections (see 00-X101-8G-E) on the block of the lance are marked as follows:

- S** Fuel supply to the atomiser and to the hydraulics operating the needle. A filter having meshes smaller than 50 µm should be present. The pressure is to be kept over 20 bar.
- MS** The supply pressure to the atomiser is available here, allowing evaluation of this pressure by a pressure gauge or sensor.
- D** Fuel return from the regulator and from the hydraulics operating the needle. In principle, the fuel should be allowed to flow freely without counterpressure. If connecting this port to a circulation system with slight overpressure, this pressure will limit the maximum possible turn down of the atomiser. The higher the pressure in the circulation system, the lower the turn down ratio will be. The counterpressure never should exceed a value of 1 Bar. Besides that, it is absolutely necessary to make sure that the pressure at port "S" is at least 20 bar higher than the pressure at port "D" under all circumstances. Only then reliable operation of the needle is ensured.
- MR** The return pressure from the atomiser is available here. The mounted pressure gauge shows the actual value. A sensor allowing evaluation of this pressure could be mounted instead.
- C** The operating pressure behind the piston on the actuating rod which moves the needle is available here, allowing evaluation of this pressure by a pressure gauge or sensor. While the needle is closed or moving, the pressure lies below the pressure at port "S". Only when the needle is completely retracted this pressure will reach exactly the same value as the pressure at port "S". Consequently, this behaviour allows hydraulic checking of the end position of the needle.

To prevent malfunction, be careful when removing the plastic plugs from the connection ports and make sure no material stays behind.

When choosing fittings, make sure that the channels inside the connection block remain fully open. Even a partial blockage at one of the channels inside will inevitably lead to malfunctioning of the burnerlance.

Never use any additional sealant on the thread. The remains getting inside the lance could lead to failures. There are no objections against the use of flat gasket rings to seal the fittings.



Function

During the pre-purge period, both the external solenoid valve in the supply line and the internal volume regulator are open. The build-on coil is currentless and the valve operating the needle is closed. Thus, the spring loaded actuating rod pushes the needle against the seat of the orifice up front, keeping it closed, preventing fuel from reaching the furnace prematurely. The pressure at port "C" is 0 bar or equals the pressure in the circulation system if port "D" is connected to such a system. The fuel circulates from port "S" via the swirler in the atomiser through the lance and via the regulator toward port "D", heating the whole up to operating temperature.

Before opening the build-on solenoid valve, make sure the IGNITION IS TURNED ON. In addition, the internal regulator and the combustion airflow are to be adjusted beforehand in such a way that the burner will START ON LOW FLAME.

The coil is marked with the relevant electrical data. As soon as one switches on the build-on coil, the fuel for actuating the needle is no longer blocked; the rod retracts, the needle opens and the ignition causes a flame immediately. As long as the needle is open, in addition to the return flow from the atomiser, a small extra fuel flow coming from the hydraulic system is leaving port "D".

During a short interval, while the piston is moving from closed to opened needle position, the pressure at port "C" always is at least 2 bar below the pressure at port "S". As soon as the piston reaches its end position, where the needle is completely opened, the pressure at port "C" equals the pressure at port "S".

The integrated volume regulator in the return line controls the output flow of the atomiser. Turning the regulator shaft changes the flow through the regulator. The marking of "+" and "-" always refers to the throughput of the regulator and not to the output of the actual atomiser. The throughput of the regulator is at minimum with the pointer at "-". Turning the regulator shaft towards "+" increases the throughput of the regulator. Therefore, for a return flow atomiser, the output of the atomiser will be at minimum if the pointer is at "+".

The flanges have a scale with 15° division. This scale allows reproducible adjustment of the regulator during operation.

The throughput of the regulator always is related to a certain pressure difference between the inlet and the outlet of the regulator. The pressure drop across the regulator and the maximum throughput depend on the actual atomiser and system particulars. In order to benefit from the maximum angle of travel, the choice of the size for the regulator should be made in such a way that its maximum throughput fits the actual atomiser. Here also system particulars should be taken into account.

Interruption of the power supply to the build-on coil leads to immediate closing of the needle, handled by the spring. The fuel flow from the atomiser stops abruptly. The pressure at port "C" drops to 0 bar or to the pressure in the circulation system if port "D" is connected to such a system. The fuel circulation from port "S" via the swirler and the regulator toward port "D" continues as before, maintaining the temperature of the lance.

If firing heavy fuel, we advise mounting a heating device to preheat the lance for those applications where the fuel supply to port "S" often stops during longer intervals. Normally it is sufficient to apply an electrical heating plate just to preheat the connection block at the lance. Four threaded bores in the connection block allow mounting such a heating plate. This heater could work permanently, but it should at least be switched on in time before fuel is supplied to port "S" to achieve correct operation of the control system inside the lance.



Maintenance

The burnerlance normally does not require any maintenance. Wear or damage of the orifice, the swirler and the needle highly depend on fuel quality. The complete atomiser is easy to exchange.

The only moving parts inside the lance are the regulator shaft and the actuating rod with the piston.

After a long period of operation, depending on fuel quality, wear on the sleeve or on the regulator shaft can occur, resulting in an increase of leak flow at minimum throughput.

After a while some wear may occur on the o-rings. Complete seal sets are available for replacement.

Regulator repairs

In case of wear of the sleeve or of the regulator shaft, it is advised to return the burnerlance to the factory for repair. It is not recommended to perform this kind of repairs without proper tools and test equipment. The regulator shaft and the sleeve are being manufactured within close tolerances to avoid operation difficulties after such repairs.

To exchange the o-rings in the flange, remove the pointer, held by 1 screw. Remove any damages and polish any sharp edges at both ends of the regulating shaft. Remove both flanges, each held by 2 screws, but leave the regulating shaft in its place. Carefully remove both o-rings from their grooves using a sharp needle without damaging the flanges in any way. Before re-assembly, make sure all parts involved are undamaged and perfectly clean. In case the regulator shaft has come out by accident, put it back in the correct position. Otherwise, the regulator will not function at all afterwards. Put the new o-rings in place. Near the o-rings, the regulator shaft should be absolutely free of damages. Re-assemble in reverse order.

The position of the pointer on the regulator shaft has been pre-set at the factory. Both ends of the regulator shaft have a pit for fixing the pointer in the correct position. If the regulator shaft is mounted properly and the pointer is fixed again using this pit, the characteristic of the regulator will not change after replacement of o-rings.

Needle actuation repairs

Before taking one of the following steps, remove the atomiser from the lance. Always pay attention not to damage the sealing surfaces at the adaptor and the atomiser. Before re-assembly, make sure all parts involved are undamaged and perfectly clean.

To exchange the o-ring 12,42x1,78 on the piston, remove the pressure gauge and the control block, held by 3 screws. Pull out the bearing together with the o-ring 18,72x2,62. Exchange the o-ring 12,42x1,78 and put the bearing with o-ring back in place. Now we can mount the control block, keeping in mind that the 4 bores with o-rings 2,57x1,78 should correspond with the 4 bores at the back of the connection block of the lance.

To exchange the inner o-ring 6,02x2,62, remove the pressure gauge and the control block, held by 3 screws. Pull out the bearing together with the o-ring 18,72x2,62. Use a piece of wood or plastic to push back the rod. **WARNING FOR INJURY:** The actuating rod comes out suddenly. After that, you can pull it out easily.

The actuating rod has to be taken apart to exchange the o-ring 6,02x2,62. The rod in lances longer than 800 mm is – for extra guidance – provided with triangles. Each triangle is secured with a pin. Remove these pins and triangles. Clamp the free end of the rod in a bench vice with soft jaws placing the stop against the jaws. Remove the pin holding the stop and release the spring pressure by slowly opening the vice. Take off the stop, the spring, the spring disc and the disc. Polish any sharp edges on the rod and exchange the o-ring 6,02x2,62. Near the o-ring, the rod should be absolutely free of damages. Re-assemble the actuating rod in reverse order.



To test, put the actuating rod into the burnerlance without the o-ring 12,42x1,78 and without the o-ring 18,72x2,62 on the disc. The rod should move freely. Pull it back a little, mount the o-ring 18,72x2,62 on the disc and push the rod in place. Slide the bearing over the piston in the connection block and turn it to check the fit. If fitting correctly, mount the o-ring 12,42x1,78 on the piston and push the bearing with the o-ring 18,72x2,62 back in place. Now we can mount the control block, keeping in mind that the 4 bores with o-rings 2,57x1,78 should correspond with the 4 bores at the back of the connection block of the lance.

Finally, screw on the pressure gauge and mount the atomiser as described under "Mounting the atomiser".